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[illegible]

8x16 city track plan
turn to page 48 for details

LIONEL in 1958

Space-age strategy for Super O and O-27 trains page 50

HOW TO

MAKE spring loaded track switches page 71

BUILD a drive-in theater from a DVD player page 46

WIRE Lionel command control page 73

TWO GREAT LAYOUTS inside

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[illegible]

Contents

04/05 Volume 72, Number 04

On the cover: Double-heading past the Weiser River on Dave Ellis's Pacific & Idaho Northern [illegible]

[illegible] **From the Editor**
How much is too much?

[illegible] **News & Products**
Hobby industry news and product announcements

[illegible] **Railway Post Office**
Letters from our readers

[illegible] **Workin' on the Railroad**
[illegible]
[illegible]

[illegible] **Workshop**
[illegible]

[illegible] **Coming Events**
Upcoming shows, conventions, and tours

[illegible] **Step by Step**
[illegible]
[illegible]

GREAT MODEL LAYOUT
[illegible] **To the mines for silver**
[illegible] Pacific & Idaho Northern
[illegible]

[illegible] **Desert scenery . . . without breaking a sweat**
[illegible]
[illegible]

[illegible] **Build N scale switch stands**
[illegible]
[illegible]

GREAT MODEL LAYOUT
[illegible] **Urban railroading in a Gulf Coast port**
[illegible]
[illegible]

[illegible] **Main line through the mountains**
[illegible]
[illegible]

56 A coal mine and details for the Turtle Creek
[illegible]
[illegible]

72 Passenger cars from core kits
[illegible]
[illegible]

[illegible]
82 Hooked on British rails
[illegible]
[illegible]

89 Information Desk
[illegible]
[illegible]

92 DCC Corner
[illegible]
[illegible]

96 Product Reviews
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

103 Trains of Thought
[illegible]
[illegible]

109 MR's Art Curren Kitbashing Contest rules

121 Index of advertisers

122 Model Railroading is Fun
[illegible]
[illegible]

[illegible]

[illegible]

EDITORIAL

No Tears for LeVan

[illegible]

D[illegible]

[illegible]

> **The fate of Conrail's top man, David LeVan, is certain. When all is said and done, Mr. LeVan is out of a job**

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10 [illegible]

12 [illegible]

14 [illegible]

16 [illegible]

18 [illegible]

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[illegible]

National conventions

[illegible]

New hobby shops

Arizona, Lake Havasu
[illegible]

California, Tehachapi
[illegible]

New York, Cold Spring
Hudson Valley Trains
[illegible]

Oklahoma, Norman
[illegible]

Virginia, [illegible]
[illegible]

Wisconsin, Brookfield
[illegible]

[illegible]

[illegible]

Micro-Trains expands Z line

[illegible]

Rapido Trains Inc. to offer ready-to-run passenger cars

[illegible]

HO scale locomotives

[illegible]

[illegible]

HO scale freight cars

[illegible]

[illegible]

[illegible]

General American Car Co. 36-foot double-sheathed refrigerator car. [illegible]

36-foot single-sheathed boxcar. [illegible]

HO scale passenger equipment

40-foot express boxcar. [illegible]

HO scale locomotive

Rotary snowplow with oil tender. [illegible]

HO scale structures

Midwest farm combination set. [illegible]

Southern Pacific Type 22 two-story combination depot. [illegible]

Green's Funeral Home. [illegible]

Main Ave. Part Two. [illegible]

Atchison, Topeka & Santa Fe Hermosa Beach, Calif., freight depot

N scale Evans gondola

[illegible]

[illegible]

Taco Bell restaurant. [illegible]

HO scale details and accessories

Window glazing. [illegible]

[illegible]

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N scale freight cars: New freight cars from Micro-Trains Line Co. [illegible]

[illegible]

[illegible] dragline. [illegible]

N scale locomotives

2-8-0 Consolidation steam locomotive. [illegible]

General Electric [illegible] diesel locomotive. [illegible]

N scale freight cars

[illegible] hopper. [illegible]

Pullman 40-foot double-sheathed refrigerator car. [illegible]

[illegible] hopper. [illegible]

N scale structures

[illegible]

[illegible] platform base with brick [illegible], detail parts, and window glazing. Based on New Jersey [illegible] prototype [illegible]. [illegible] brown, gray and [illegible], and [illegible] green. [illegible] 2006. Atlas Model Railroad Co.

O scale freight cars

Association of American Railroads 1937 40-foot single-door boxcars. [illegible] road numbers [illegible] decorated for New York [illegible] Canadian National, Southern Pacific, and Southern Ry. [illegible] August 2006. Ready-to-run. Atlas O.

United States Railroad Administration 55-ton coal hoppers. [illegible] road numbers [illegible] for New York Central and Pennsylvania RR. [illegible] include Chicago, Burlington & Quincy, [illegible], and [illegible] Public Service Electric Co. [illegible] June 2006. Ready-to-run. Atlas O.

O scale details and accessories

Ford "Q" [illegible] fire truck. Boston, Chicago, [illegible] San Francisco and Washington, D.C. [illegible] Atlas? [illegible]

Electronics/controls

Right Track power pack. Upgraded electronics, separate power and direction switches, circuit-breaker protection, and overload-indicator lamp. $44.95. Spring 2006. Atlas Model Railroad Co.

Universal couplings. [illegible] 90 degrees. Set includes enough components to assemble four universal couplings up to

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News & Products

On3 + Galloping Goose railbus: [illegible] Rio Grande Southern [illegible]

[illegible]

Interior lighting kit: [illegible]

N Gauge Brilliant Genesis [illegible] sound decoders. [illegible]

Light-emitting diode headlights: [illegible]

Scenery

Dark gray ballast: [illegible]

Software

TrackScape: [illegible]

[illegible]

Books

[illegible] Layout Booklet [illegible]

Civil Engineering for Outdoor Railroads Vol. 4 [illegible]

Down to the Earth: [illegible]

Scale drawings of the Peach Bottom Ry., later known as the Lancaster, Oxford & Southern RR Vol. 1: [illegible]

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2006 One Source Scale Model Railroad Industry Directory. [illegible] [illegible] manufacturers and publishers in the United States and Canada. [illegible] [illegible] plus $3.50 shipping. [illegible] Railway Press.

Video/DVD

Great Model Railroads, Vol. 32 [illegible] [illegible] & [illegible] in the [illegible] issue of Model Railroader. Includes tips [illegible] [illegible] [illegible] shipping. [illegible] Productions.

Train Play [illegible] Model Railroad Museum. Includes footage of the [illegible] model railroad [illegible] [illegible] with model railroaders. [illegible] minutes. [illegible] plus [illegible] shipping. California residents add [illegible] percent sales tax. [illegible] Model Railroad Museum.

Constructing [illegible] [illegible] Model Building Kits. [illegible] [illegible] Includes tips on adding [illegible], weathering, and detailing [illegible] [illegible] minutes. [illegible] plus [illegible] shipping. [illegible] [illegible].

The Great Train Story [illegible] [illegible] HO scale layout at Museum of Science and Industry in Chicago, Ill. [illegible] [illegible] Books & Video.

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Ambrol Inc. 50-foot double-door boxcar. Accurail HO scale kit. [illegible] plus [illegible] shipping [illegible]. Rhode Island residents add 7 percent sales tax. Make checks payable to [illegible] Club, [illegible], [illegible] Blvd., Warwick, RI [illegible]. [illegible]

Duluth, South Shore & Atlantic [illegible]-series 70-ton offset-side triple hopper, Soo Line 40-foot boxcar ([illegible] Soo Line [illegible] paint scheme), and Green Bay & Western [illegible]-series 50-foot exterior-post boxcar. Accurail HO scale kits. [illegible] [illegible] [illegible] shipping. Soo Line Historical and Technical Society Inc., P.O. Box [illegible], [illegible], WI [illegible]. [illegible]

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6. [illegible] [illegible]

7. Blue star creeper [illegible]

8. [illegible] ice plants [illegible]

9. Creeping Mazus [illegible]

10. [illegible] [illegible]

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[illegible]

[illegible]

CN keeps adding to Dash-9 fleet; latest batch is Illinois Central's

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Hot times, but cleaner air, ahead

[illegible]

Alaska to try DPU on fuel trains

Technology will enable longer consists

Alaska Railroad Corp. (ARRC) is planning to launch Distributed Power Unit (DPU) locomotive operations on its unit fuel trains. The trains run from Flint Hills Resources North Pole Refinery, 14 miles east of Fairbanks, to its fuel distribution facility in Anchorage, 375 miles south.

DPU technology, which will be applied to a yet-to-be-determined number of its 28 EMD SD70MACs, will enable ARRC to run trains of up to 120 cars, versus the current self-imposed train length of 75 cars, as specified in the company's state-approved oil spill prevention and response plan.

To make the change, ARRC has applied for an amendment, currently up for public review by the Alaska Department of Environmental Conservation, which will require that the railroad provide satisfactory response and cleanup capability in case of a spill.

By placing locomotives at either end (or in the middle) of a long, heavy train, i.e., distributing the motive power through the consist, there is a substantial reduction in the forces that pull directly on freight cars, and that produce lateral forces on the rail. Braking efficiency and rapid recharging of the air brake system are improved, enabling an ability to respond more effectively to changing track forces. [illegible] are not new; recent improvements in software and data communications have made the concept almost an operating staple when moving heavy trains through mountainous terrain.

Since last winter, a group of ARRC locomotive engineers has received special training on the railroad's digital locomotive simulator and in the field on DPU trains. Computer models and instrumented trips confirm that DPU operation reduces in-train forces, and that locomotives consumed 8% to 10% less fuel. ARRC has not established a specific start-up date but hopes to begin fuel-train DPU operations by October.

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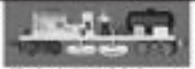

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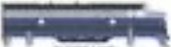

BALTIMORE & OHIO

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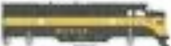

READING

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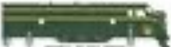

CENTRAL OF NEW JERSEY

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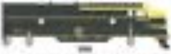

ERIE

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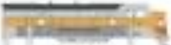

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[illegible]

THE LOSERS

[illegible]

AMTRAK WINNERS & LOSERS: RIDERSHIP IN 2005

Route/train	2005 ridership	Chg. from '04
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
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Route/train	2005 ridership	Chg. from '04
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Prototype Info

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A. [illegible]

[illegible]

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[illegible]	Conrail blue/white #[illegible]
[illegible]	Conrail blue/white #[illegible]
[illegible]	CSX gray/blue/yellow #[illegible]
[illegible]	CSX gray/blue/yellow #[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	Susquehanna [illegible] #[illegible]
[illegible]	Norfolk & Southern black/white #[illegible]
[illegible]	Norfolk & Southern black/white #[illegible]
[illegible]	Cotton Belt Bloody Nose #[illegible]
[illegible]	Cotton Belt Bloody Nose #[illegible]
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Designing the Deepwater District using CAD

[illegible]

[illegible]

By Gerry Albers

Photos by the author

W[illegible]

[illegible]

[illegible]

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Getting started with CAD

[illegible]

[illegible]

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Learning points

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CAD terminology and usage

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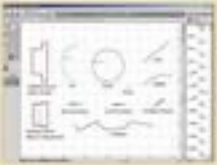
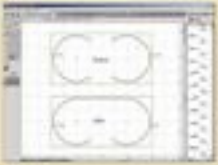
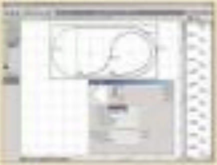






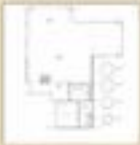
CAD objects. [illegible]

[illegible]

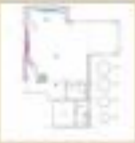
Power of CAD tools. [illegible]

[illegible]

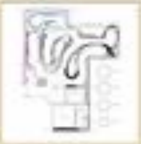
Object properties. [illegible]



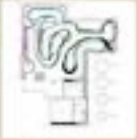
Layer 1: Layout room



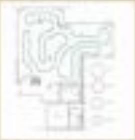
Layer 2 — plus C&O and NYC



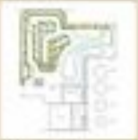
Layer 3 — plus PRR



Layer 4 — plus fascia



Layer 5 Aisles and fascia

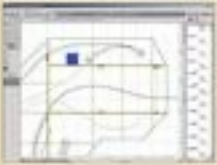


Layer 6 — plus benchwork

Layering. One of the best reasons for using a CAD program is the layers feature. Layers are like transparent overlays that can be placed "pull out" on top of each other so you don't have to show everything on the same screen. This feature can be turned on or off and can be color-coded so that when multiple layers are turned on, you can easily distinguish between them. This is where having a color printer is very helpful.

Parts of three major railroads (PRR, Chesapeake & Ohio, and New York Central in ... 1950s) are featured on my layout, and each railroad has multiple hidden staging yards. Therefore I placed each railroad and staging yard on its own layer, with the fascia, benchwork, walls, and other details on separate layers.

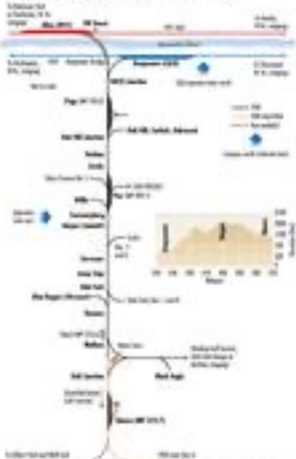
The screen captures above show that, to varying degrees, only six of the 24 layers are used in the track plan design. I started with the layout room, added the basic track diagram, created a more detailed track diagram, then created layers for the aisles, fascia, and benchwork. Once you get the hang of layering, it becomes a great organizational tool.



Zooming. The zoom feature is like using a variable magnifying glass to let you see greatly magnified detail at any desired scale calibration. You can place, move, rotate, expand, and manipulate any object in the plan, which allows you to accurately fit objects together or keep them apart. To ensure I had sufficient clearance around the support column in the basement (represented by the blue square) and to precisely locate the benchwork, I used the zoom feature. This feature allows you to uncover and thus avoid what would become costly problems during the construction phase.

The finished design can be printed in whatever scale you desire, including 1:1 on multiple sheets of paper. An entire track or yard might be printed on a single sheet if you have access to a large industrial plotter. — D.A.

Virginian Ry. New River Division Deepwater District



[illegible]

The layout at a glance

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CAD suppliers

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Best practices

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Advantages and benefits

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From CAD to construction

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THE UNION PACIFIC "DD40X" series of locomotives are in stock now at your favorite Overland Models dealer while the UP "CA-3" through "CA-10" series of steel cabooses will be available in late 2005. Be sure to place your order or reservation for these limited production models that are sure to please. Each model is accurately detailed and beautifully handcrafted in brass by Ajin Precision of Korea, factory painted and completely lettered. Visit our website at www.overlandmodels.com for prices, availability and to find an OMI dealer near you.

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MODELING PENNSYLVANIA AND PENN CENTRAL SD40s

DETAILING THE KATO SD40: EXPERT SKILLS NOT REQUIRED

by Jim Six

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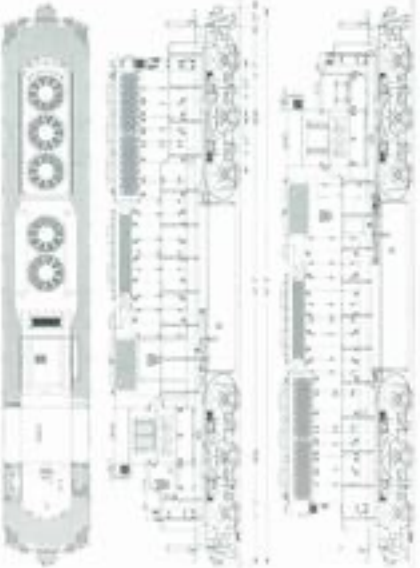
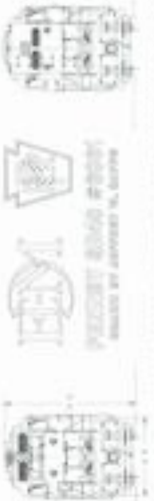
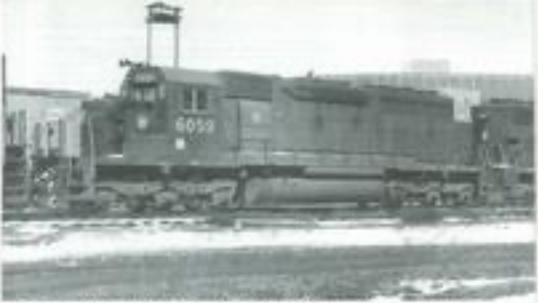
[illegible]

6066

[illegible]






6059

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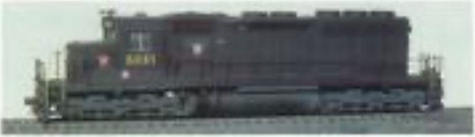
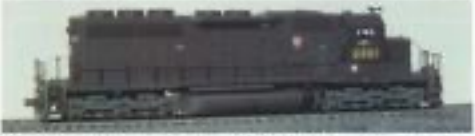
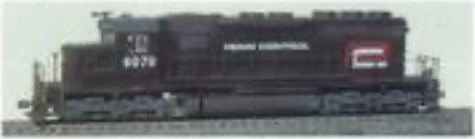
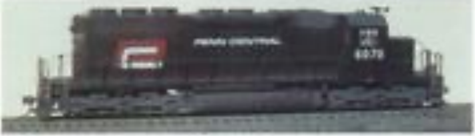
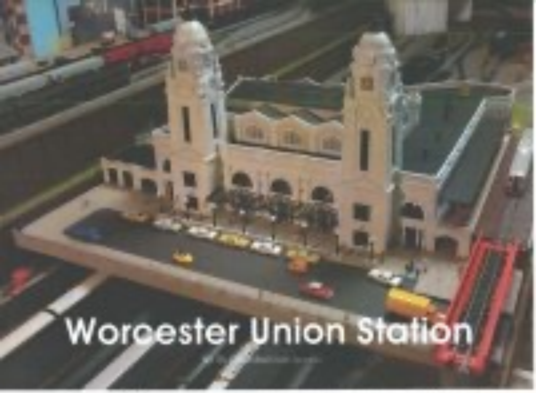




ABOVE: Jim Six's Pennsylvania SD40 6081. BELOW: Carl Murphy's Penn Central SD40 6079 represents a former PRR [illegible] with its brake cylinders mounted under the sideframes.


PENN CENTRAL
6079


PENN CENTRAL
6079



Worcester Union Station

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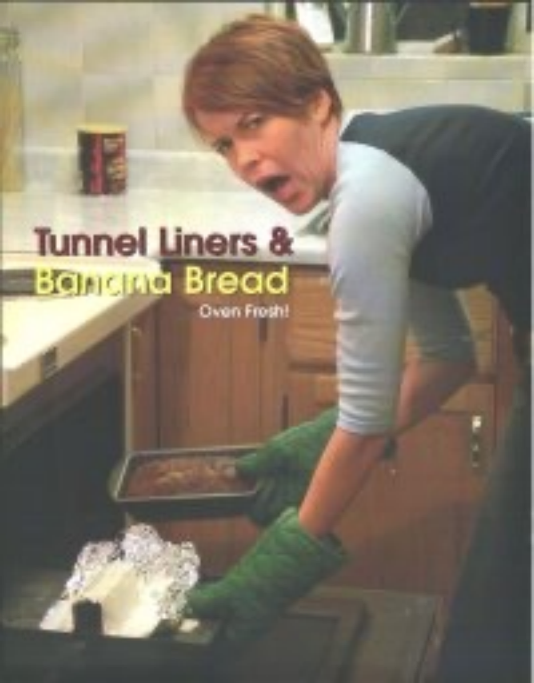
[illegible]

The above photo shows the [illegible]

[illegible]



Tunnel Liners & Banana Bread

Oven Fresh!

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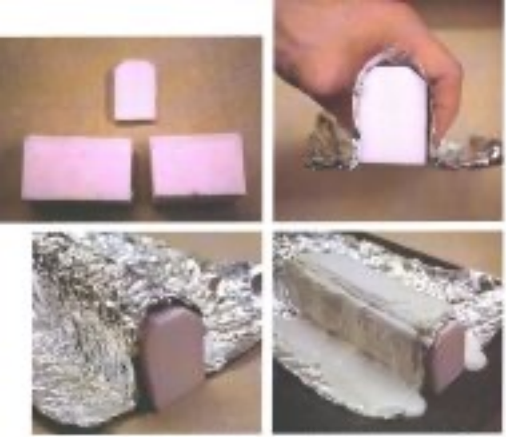


Top Row: [illegible]

Gently wrap the crinkled foil around the forms.

Bottom Row: [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Left: [illegible] the "image" [illegible]

Middle left: [illegible]

Below: [illegible]

Above: [illegible]

Left: [illegible]

COVER STORY

Lionel for 1958

A diverse, innovative train line that deserved a better fate

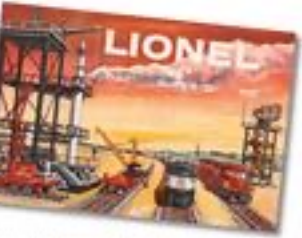
by Joe Algozzini and Roger Carp
photos by Jim Forbes

[illegible]

Diversifying to broaden Lionel's appeal

[illegible]

The no. 2329 Virginian rectifier was Lionel's only newly designed locomotive in 1958. This electric did have loads to outfits, including the no. 2509W. That five-car train included the 6519 Allis-Chalmers car and 6805 atomic energy disposal car.



The cover of the consumer catalog for 1958 depicted new locomotives and accessories in a stark landscape that emphasized Lionel's decision to push its space and military toys.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Handsome diesel locomotives decorated for the New Haven made their debut in Lionel's line for 1956. [illegible]

[illegible]

[illegible]

The no. 175 rocket launcher, shown with its no. 6175 rocket car, was one of the largest and most sophisticated of all the operating accessories that Lionel offered during the postwar period.

[illegible]

An agreement to buy military vehicles from Pyro Plastics to use as flatcar loads yielded six great freight cars in 1958. Lionel used three of them in O-27 gauge set no. 1611. A new blue diesel and a matching caboose, both lettered for the U.S. Marine Corps, added color to what has become a highly valued outfit.

Upgrading the O-27 line

[illegible]

[illegible]

[illegible]

Super O outfit no. 2527W [illegible] blends [illegible] pieces. The set's no. 2329 Minneapolis & St. Louis GP9 road switcher was a new entry in the line. Also introduced in 1958 was the no. 6802 flatcar with girders. The other cars in the set's train returned from past years.

[illegible] freight set.

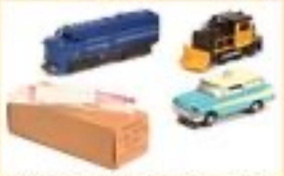
[illegible]

Super O gets better

[illegible]

[illegible]

[illegible]



Which of these Lionel rarities from 1958 would you like? Experts focus on the no. 2127 U.S. Marine Corps Alco dummy A unit (upper left) and no. 53 Rio Grande snowplow with a correctly facing lower case "a" in the road name (upper right). But the no. 68 executive inspection car in blue and cream (lower right) [illegible] added to the Lionel Postwar Celebration Series.

Rare and unique items for 1958

A handful of special trains tantalize collectors

Amid all the great items released in 1958 stand a few that qualify as rare. Variations based on color or body mold come to mind first, followed by items so different from their regular production counterparts that they likely were engineering samples of some kind.

In the first category we place such small treasures as a no. [illegible] with a white body and a no. [illegible] orange [illegible] with the earliest body mold. [illegible]

A version of the no. [illegible]

Scarcer is a no. 53 Rio Grande snowplow as issued in 1958 with the lower case letter "a" in the road name heat-stamped correctly. The previous year, when Lionel had introduced this motorized unit, the "a" in the road name had been heat-stamped backwards.

Still more difficult to find is a no. 2127 U.S. Marine Corps Alco A unit. This dummy diesel was, according to the Lionel [illegible], "made for a special outfit." Even more valuable is the box in which this rare locomotive was packed.

Equally as rare as a 2127 dummy Alco [illegible]

Lionel enthusiasts also chase after a version of the no. 6557 smoking caboose that was heat-stamped with the number on the right and not on the left, as is common. [illegible]

Our favorite unique item from 1958 [illegible] a [illegible] version of the no. 68 executive inspection car. [illegible] Who wouldn't love to own one? – Joe Algozzini and Roger Carp

Another quartet of [illegible]. The no. [illegible] (upper left) [illegible] the most action, and the [illegible] no. [illegible] Missouri-Kansas-Texas stockcar (lower right) is the model that collectors [illegible]. The no. [illegible] boat car (lower left) debuted in [illegible], but Lionel modified the frame of the car and the colors of the boat for 1958.

The no. [illegible] Virginian porthole caboose (upper right) may be the [illegible] of this foursome of rare Lionel cars from 1958. Still, don't miss the no. [illegible] Minneapolis & St. Louis hopper (lower right) or [illegible] poultry dispatch car (upper left). The truck on the no. [illegible] range patrol (lower left) is another [illegible] product.

[illegible]

[illegible]

[illegible]

STATION

[illegible]

2000
E8/9
It's Back and It's Better!

TRIX HO
AVAILABLE NOW!
Ready-To-Run
SCALE MODELS
TRIX

UPGRADING THE KATO HO SCALE G.E. AC4400CW

By Steve Orth

[illegible]

[illegible]

[illegible]

The Kato Model

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

UNION PACIFIC
5765

[illegible]

[illegible]

5714

KATO AC4400CW

[illegible]

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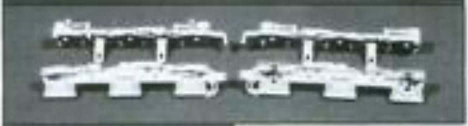
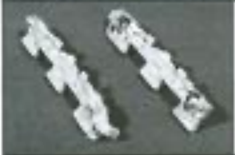
[illegible]

Right side showing air filters

UNION PACIFIC
5



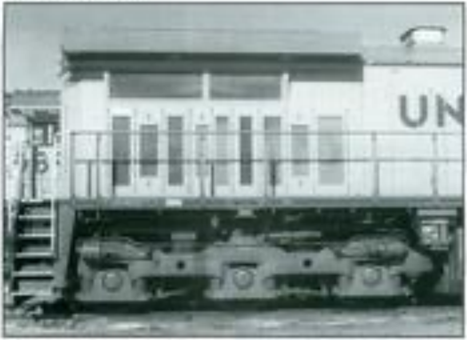
Sideframes, Rear and [illegible] Dampers



Sideframes showing dampers and brake cylinders.

The completed locomotive showing the modified trucks.

5767
UNION PACIFIC



[illegible]

[illegible]

[illegible]

Shell Details

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Sound Installation

[illegible]

[illegible]

[illegible]

[illegible]

Final Assembly and Painting

[illegible]

[illegible]

BILL OF MATERIALS

Athearn

[illegible]

Details West

[illegible]

[illegible]

[illegible]

[illegible]

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[illegible]

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[illegible]

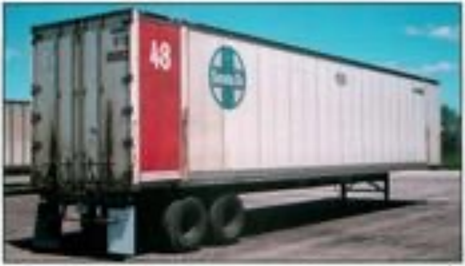
Train Station Products

[illegible]

48-FOOT STOUGHTON-BUILT SHEET & POST CONTAINERS FROM WALTHERS HO SCALE KITS

By Brian F Kreimendahl

The Walthers HO scale containers are replicas of some of the most common intermodal units in America. Here are some of the paint and lettering schemes used on the prototypes. There's an index of all previous articles on intermodal modeling on our website at www.railmodeljournal.com



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WALTHERS HO SCALE CONTAINERS

[illegible]

[illegible]

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Walthers HO Scale Models

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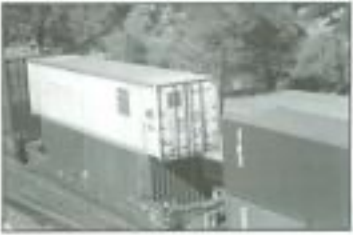

[illegible]

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TTX

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AMERICA

[illegible]

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AMERICA

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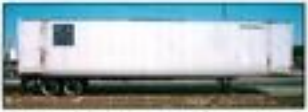

[illegible]

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Classic "T" shank coupling

Something old that may be new to many folks

[illegible]

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[illegible]

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Lessons of the South Penn

What building a fairly large HO layout taught one hobbyist

BY NEAL SCHORR

[illegible]

M[illegible]

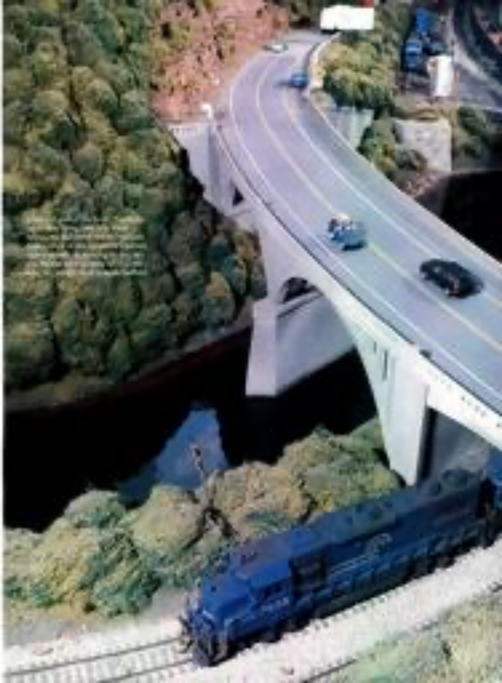
[illegible]

A quick history lesson

[illegible]

[illegible]

[illegible]



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Progress on the layout

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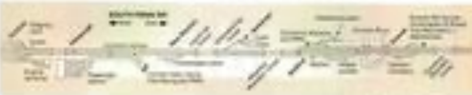

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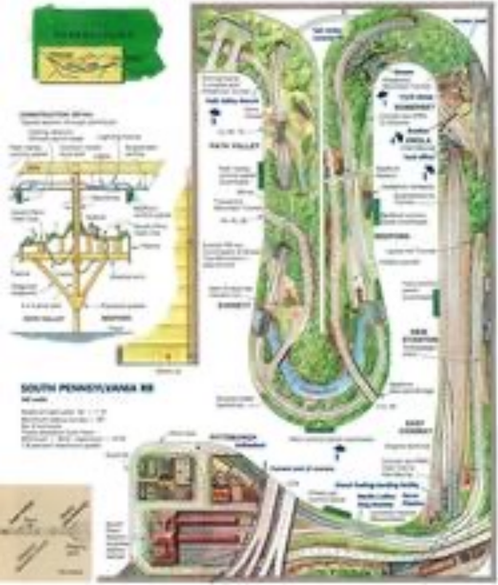

PATH VALLEY
BEDFORD
EVERETT
NEW STANTON

SOUTH PENNSYLVANIA RR

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Scenery – room for improvement

[illegible]

Right of way details

[illegible]

The next chapter

[illegible]

Dunckley Northern Railways Nº 15

Construction notes on a 1:22.5 scale, 2-6-2 + 2-6-2 freelance Garratt locomotive

[illegible]

[illegible]

[illegible]

Notes on the full-size Garratt locomotive

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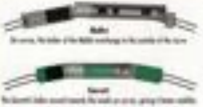
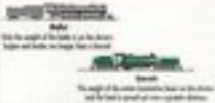

Mallet
Garratt

Comparison of Mallet and Garratt on curves


Mallet
Garratt

Size comparison of Mallet and Garratt of similar wheel configurations

[illegible]

[illegible]

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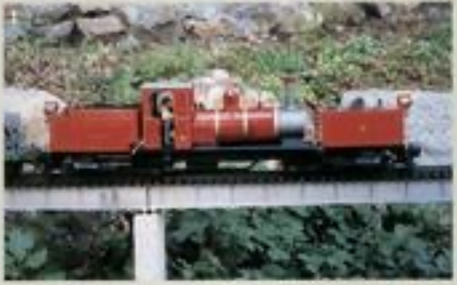
Suggestions for designing your freelance Garratt

[illegible]

Dunckley Northern Railways Nº 8



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3

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4

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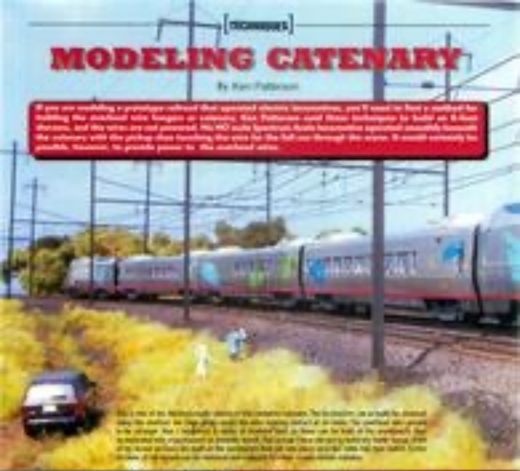
5

[illegible]

MODELING CATENARY

By Ken Patterson

If you are modeling a prototype railroad that operated electric locomotives, you'll want to find a method for building the overhead wire hangers or catenary. Ken Patterson used these techniques to build an 8-foot diorama, and the wires are not powered. His HO scale Spectrum Acela locomotive operated smoothly beneath the catenary with the pickup shoe touching the wire for the full run through the scene. It would certainly be possible, however, to provide power to the overhead wires.



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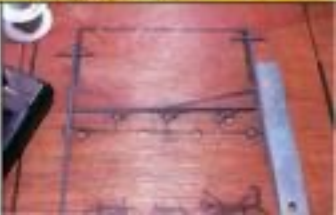
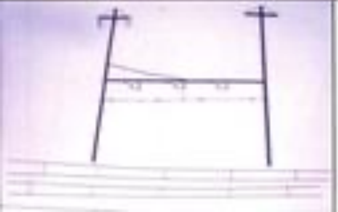


This photo shows how I made an assembly jig with the [illegible]



I used Walthers transmission tower parts (the insulators) for this project. They served to hold the [illegible] high-power transmission lines and the small insulators in between the railroad's catenary lines. With the same [illegible] jig, [illegible] to the [illegible] [illegible] holes. These were made to allow for the correct placement of the insulators [illegible] the insulators was positioned [illegible] the center of the wire. I accomplished this task by heating the [illegible] just enough to melt the insulator around the wire. After all were in place, I [illegible] the whole assembly [illegible] to properly [illegible] and [illegible] the insulators all the way [illegible] the gap [illegible] the [illegible] process.

[illegible]

[illegible]

[illegible]

KATO
At last...
in HO Scale
CP
CANADIAN PACIFIC

The EMD SD80MAC and SD90/43MAC are headed this way!

Expected to be in stores in early June, these models will be the longest and most detailed reproductions of a North American prototype ever produced in HO scale by KATO.
Visit your local hobby shop or our web site for COMPLETE details of these models.

SD80MAC	Undecorated	Item #37-6040
SD80MAC	Conrail #4100	#37-6041
SD80MAC	Conrail #4105	#37-6042
SD80MAC	Conrail #4125	#37-6043
SD90/43MAC	Undecorated	#37-6050
SD90/43MAC	Canadian Pacific #9130	#37-6051
SD90/43MAC	Canadian Pacific #9133	#37-6052
SD90/43MAC	Canadian Pacific #9133	#37-6053
SD90/43MAC	Union Pacific #8104	#37-6054
SD90/43MAC	Union Pacific #8105	#37-6055
SD90/43MAC	Union Pacific #8166	#37-6056
SD90/43MAC	Union Pacific #8038	#37-6057
SD90/43MAC	Union Pacific #8039	#37-6058
SD90/43MAC	Union Pacific #8039	#37-6059

NEW!! . . . Arriving in stores in May!

N Scale Amtrak Superliner and Material Handling Car Sets

Build an impressive Amtrak consist by combining these car sets with our recently-released P42 "Genesis" locomotives! These are the finest modern-day passenger service models available today, isn't it time for your layout to go Amtrak?

KATO U.S.A., INC. · 100 Remington Road · Schaumburg, IL 60173

www.katousa.com

Ribbons

PHOTO BY [illegible]

To cope with heavier trains and more traffic,
rail is getting bigger and better —
and some of it is made in Japan

# of steel

by Tom Murray

[illegible]

[illegible]

[illegible]

A rail train picks up used rail during a track project on BNSF's Cuba Subdivision in Missouri. The old rail will be reconditioned as "relay" rail for use on secondary sidings and in yards.

Pennsylvania Railroad, which considered itself a leader and innovator, specified some unique rail designs (indicated by the letters "PS" on the side of the rail), including a 152-lb. section. It was superseded by the heaviest rail ever used on a North American railroad, 155 pounds, produced for PRR from 1946 to 1955. Several other carriers, including Chicago & North Western, Great Northern, Lackawanna, Lehigh Valley, New Haven, New York Central, Reading, and Santa Fe, used rail produced to company rather than industry specifications. From the 1930s to the mid-1980s, Union Pacific specified a 133-lb. AREMA design not generally used by other carriers, and UP continues to buy some of this rail for replacement trackwork.

The 141-lb. design that is becoming increasingly common has been included in the AREMA manual since 2002, but it didn't receive final AREMA committee approval until 2006. Starting in 2005, it will be produced as "141 RE." Previously, it has been designated "141 AB," for the two people who developed it: Sam Atkinson, senior manager methods and research at Union Pacific, and Randy Bowman, senior metallurgical engineer at Norfolk Southern.

As Bowman explains, "Mr. Atkinson and I developed the 141 AB rail design under an assignment for AREMA Committee 4 intended to create a common rail section that all major Class I railroads in North America would adopt as the industry standard. When it was adopted as a recommended rail section in 2003 by AREMA, it was officially an AREMA section, even though it was not called 141 RE. Things sometimes move slowly in committees, thus it has taken four years to have the AB designation changed to RE."

As rail has bulked up, much of the gain has been in the head. This has allowed for greater wear before rail must be replaced. But rail wear isn't as simple as measuring the loss of steel in the head. Aside from wear, rail life is also determined by the amount of deformation and fatigue that a piece of rail exhibits over time. Each of these three elements has specific causes, and railroads as well as steelmakers have taken measures to overcome them.

Rail wear is worst in curves, where wheels try to go forward but are forced left or right by the rail. For years railroads have used wayside lubricators to mitigate abrasion on curves, thereby reducing wear on both wheels and rail. More recently, locomotive-mounted lubrication systems have helped reduce rail wear and cut fuel consumption. Locomotive radial trucks, more flexible than standard rigid-frame trucks, also have helped improve the wheel-rail interface.

Engines have a negative effect on rail life, too. In the days of the steam locomotive, slipping driving wheels could create an "engine burn" in rail, sometimes severe enough to require that the rail be replaced. Wheel slip continues to be a problem in the diesel era. Although modern high-horsepower locomotives have systems designed to control wheel slip, the skill of the engineer, as well as rail conditions, tonnage, curvature, and other factors, all play into the equation. Yet there are still times when wheels slip ... and the rail suffers.

Railroads use different specifications for "premium" rail intended for curves rather than for "standard" rail which is installed on straight, or tangent, track. Head-hardening is one technique producers use to achieve a premium specification. It involves quenching the rail using a controlled air or air-water system while it is still hot after rolling. Alloys also have been used to produce a harder, more wear-resistant rail. However, there is a limit to how hard rail can be made before it becomes brittle, which raises the risk of breakage. Rail also has to be weldable, and some alloys are resistant to this critical process.

Deformation occurs in both curved and tangent rail. Essentially, as wheels move over the rail, creating pressure and heat, the material in the head of the rail flows, causing the rail to lose its original profile. During the past decade, railroads have increased the frequency of rail grinding to help restore a desirable profile. In the process, a small amount of steel is removed from the rail, but this loss is considered an acceptable price to pay for grinding's life-extending benefits.

Rail grinding also helps address the third factor affecting rail life: fatigue, i.e. deterioration of the rail from cracks, flaws, and other defects that occur over time. Some cracks start in the surface of the rail and, unless they are addressed quickly, can spread to the point where the rail would have to be replaced. By removing a thin layer of metal from the rail, grinding eliminates surface cracks before they become more serious.

The use of concrete crossties also has created greater demand for rail grinding. Because concrete ties' rigidity makes them less forgiving than wooden ties, they create different rail wear patterns. This has made it necessary to grind more frequently to stay ahead of the wear.

In addition to [illegible]

A BNSF crew (above) helps line up used rail as a machine pulls it up and onto the rail train. The worker in the middle is using a pneumatic wrench to attach single rails to connect additional lengths of rail for loading.

High atop the stack on the rail train, a worker uses an oxyacetylene torch to cut through a length of rail that has reached the train's requirements. 1440-foot-long loading limit.

Thermite weld heated in a [illegible] crucible will flow downward into a mold around a rail joint to make a "field weld." Later, a track worker will grind off excess material.

Sparks fly as a Loram Corp. rail grinder makes a [illegible] on CSX's former Chesapeake & Ohio coal line near Hastings. [illegible] Periodic rail grinding helps restore the profile of the rail and extend its useful life, as well as smooth out tiny cracks that can lead to serious rail fatigue.

as rail, there have been two obvious changes in the way rail is produced and maintained, and in who produces it. Historically, rails were produced through a batch process known as ingot casting. This created the potential for variations between batches, which required careful inspection of the end product. Starting in the 1970s, continuous casting was introduced, which produced a higher-quality rail with fewer impurities in the middle and better surface quality on the outside.

Overseas steelmakers were the first to go to continuous casting, but the two major North American producers eventually adopted this method. The two big U.S. producers have been Bethlehem Steel at Steelton, Pa., now part of International Steel Group, and known as ISG Steelton, and Colorado Fuel & Iron at Pueblo, Colo., now part of Oregon Steel Mills and known as Rocky Mountain Steel Mills, or RMSM. Steelton adopted this method in 1986 and Pueblo in 1996.

In the meantime, however, foreign steelmakers, notably two Japanese firms, began to produce rail widely considered to be of higher quality than anything available in North America. The two big Japanese players are Nippon Steel, whose rail is marketed by Sumitomo Corp., and NKK Steel, now part of the JFE Group and marketed by Mitsui & Co.

In the late 1970s, some U.S. railroads began to buy Japanese rail, particularly for use in curves. Not surprisingly, western carriers were at the fore. Union Pacific is the largest user of Japanese rail in the U.S., and BNSF also purchases substantial amounts of rail from Japan. Canadian National and Canadian Pacific also buy most of their rail from Japan. Eastern giants CSX and Norfolk Southern have bought rail from European producers, such as France's Corus and Czech Republic's Trinecke Zelezarny, but European steelmakers are not considered a major factor in the North American market.

Overall, imports have had a 30% to 35% share of the U.S. rail market in recent years, but recent weakness in the dollar against the Yen and the Euro has made foreign rail somewhat less competitive.

The production technique used by the Japanese steelmakers [illegible] isn't necessarily better. While they do use continuous casting, these producers make steel using the traditional basic oxygen furnace (BOF) process, which relies primarily on iron ore as a raw material. U.S. producers have converted to electric arc furnaces, which typically use scrap steel as their main input.

However, in the process they have become captive to the vagaries of the scrap-metal market. Recently the price of scrap has more than doubled because of the ramp-up of the Chinese industrial economy. This, in turn, has caused a jump in the price of U.S.-produced rail. Meanwhile, BOF producers have also seen costs rise because of the Chinese appetite for coke used in the iron-refining process.

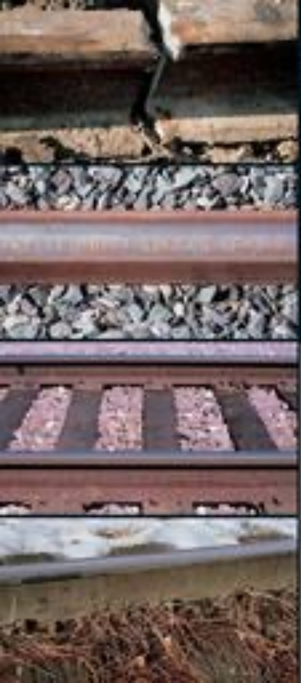
In the past 20 years the number of North American producers of rail has shrunk from six to two. U.S. Steel, which had produced rail for decades at

[illegible]

Rail plants: made to order

[illegible]

[illegible]



Top to bottom: Jagged edges of a broken rail on former Milwaukee Road track [illegible] show the effect of years of wear, [illegible] and, perhaps, lack of proper maintenance. . . . The code on the web of Union Pacific rail at [illegible], Calif., shows its weight and designation ([illegible] lb.), manufacturer [illegible], and manufacturing date [illegible]. [illegible] . . . Burlington Northern Santa Fe rail at Colton, Calif., shows it is a [illegible]-lb. section made by Rocky Mountain Steel Mills [illegible]. [illegible] conforms to [illegible] standards of the American Railway Engineering and Maintenance of Way Association. . . . A section of [illegible] rail on the Grand Canyon Railway in Arizona has an older pedigree: Colorado Fuel & Iron at Pueblo turned out the [illegible]-lb. section in [illegible]. The [illegible] means it was an "open hearth" [illegible].

replaced. This equates to 20 years of service on a 100-million-ton per year line, i.e. very heavy traffic density, and this is obviously not the newest rail.

The director of rail for a western carrier notes that, in years past, tangent rail typically would be replaced when it reached a certain level of defects. He believes that increasingly in the future, tangent rail will be used until it wears out, rather than "defects out," as long as it receives periodic rail grinding. Moreover, he explains, in the past two seemingly identical pieces of rail, rolled at different times or produced by different mills, might have had wide variations in their incidence of defects; today's rail is more consistent.

Rail on curves, by contrast, almost always wears out before it defects out. The amount of tonnage that rail on curves can accumulate is related to the degree of curvature. On one major carrier, the average interval between rail replacement is [illegible] million gross tons for rail in 2-degree curves but only [illegible] MGT in 10-degree curves.

One fairly extreme case of rail wear involves BNSF's coal line over Crawford Hill in northwestern Nebraska, where the railroad has two 8-degree curves back to back. With trains

On BNSF's Glasgow Subdivision in Montana, formerly the Great Northern "High Line" in the Pacific Northwest, a fading sunset highlights what every railroad [illegible]: safe, smooth, reliable rail.

River Basin coal tonnage running at more than 200 million gross tons per year, the railroad says it is lucky to get two years of life out of the rail. On the other hand, BNSF says that because of improved rail quality, it is replacing less rail on curves each year than it did 5 or 10 years ago.

Long rail life is desirable for many reasons, some of them obvious, some less so. Clearly, if railroads don't have to change out rail as often, it saves the cost of purchasing and installing new rail. Equally important is the fact that, as traffic grows on key line segments, providing work windows (scheduled suspension of train service over a specific territory) for the replacement of rail is very expensive, playing havoc with train schedules, crew utilization, and customer satisfaction. One rail [illegible] said that work windows have become the most precious commodity he deals with.

Although continuous welding can produce longer rails, 80 feet remains the standard for North American purchasers. This is more than double the 39-foot standard length typical in the jointed-rail era but less than that [illegible] standard. It is dictated by logistical realities. The reason 39 feet became standard is that cars of the era typically were 40 feet long, which meant a 39-foot rail would fit nicely into the bed of a gondola.

Most rail is more likely to be shipped as "sticks" in the 80-foot to 85-foot range. [illegible] 80-foot lengths because it must be shipped by rail from mills to rail welding plants, and because the cargo hatches of ships used in this service cannot accommodate anything longer than 80 feet.

Some of the rail shipped by RMSM and CSN, however, doesn't go very far before being welded. Roughly one-third of RMSM's production goes to two welding plants just outside its property line in Pueblo. The plants are operated by outside contractors, who weld the rail for customers such as BNSF, Union Pacific, and Kansas City Southern. CSN has a similar arrangement with a contractor at its Steelton plant in Pennsylvania. CWR typically moves on racks stacked on a string of flatcars.

SDI says its new Indiana rail mill will be able to produce [illegible] or 320-foot rails, so the company is looking at various ways to ship those rails using articulated freight cars. This would reduce the number of welds required to create a string of welded rail, typically between 1,300 and 1,600 feet long. SDI also plans to have an in-house welding plant, which will reduce the handling required to produce long strings of rail.

Regardless of emerging changes in the production or shipment of rail, or in the number of North American producers, long-wearing, defect-free rail continues to be critically important to providing efficient, safe, reliable rail service. ■

TOM MURRAY is the editor and publisher of the quarterly financial newsletter Rail StockWatch. He has worked as an executive in rail operations and marketing for Boston & Maine, Soo Line, CSX Transportation, and Southern Pacific. This is his 20th feature for TRAINS.

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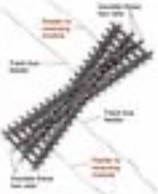

Fig. 1 Wiring. [illegible]

[illegible]

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HO SCALE REVIEW

Life-Like P2K Heritage Series USRA 0-6-0

by Rich Pizarello

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

HO SCALE REVIEW

Walthers NSC 53' Well Car Model

by David G. Casdorph

Photos by the author

[illegible]

Pros

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

Cons

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

MULTI-SCALE REVIEW

Minirail Computer Car Routing System

by John Bruce

B[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Sample Minirail switchlist

[illegible]

[illegible]

[illegible]

N SCALE REVIEW

Atlas GE B30-7 & B36-7

by Kent Charles

Photos by the author

J[illegible]

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Trackside Photos

On a quiet summer morning in Burlington, Vt., Rutland Alco RS-1 no. 402 brings in a cut of boxcars for the Peerless Tanning Co. Lou Sassi of Charlton, N.Y., shot the photo on an HO scale diorama he built for his upcoming book *How to Build and Detail Model Railroad Scenes*, available later this year from Kalmbach Publishing. George Mellon painted the RS-1 (a Sunset Models import), and Rich Crete scratchbuilt Peerless Tanning Co.

Atchison, Topeka & Santa Fe H-12-44 no. 508 leads a westbound grain train past Kansas City Southern Steel. Chuck Hitchcock of Prairie Village, Kan., photographed the scene on the HO scale Argentine Industrial District layout.

9611

Moving a loaded [illegible] train [illegible] Burlington Northern SD70MAC no. [illegible] and Electro-Motive Division SD80MAC demonstrator no. 4. The coal train was photographed by Trains.com content and business manager Erik Bergstrom on the Milwaukee, Racine & Troy, Kalmbach's HO scale club layout. To learn how Erik modeled the SD70MAC, read this month's installment of Workshop on page 36.

A pair of Monon [illegible] road switchers sporting Purdue University black and gold paint cross a bridge near Diamond, Ind., with a southbound train. Lance Mindheim of Silver Spring, Md., modeled and photographed the N scale scene.

The Last Word . . . By Jim Giblin

Trucks vs Trains: Myth vs Reality

[illegible]

[illegible]

Was it the highway system that devastated the railroads, or was it railroading's inability to keep pace?

[illegible]

[illegible]

nsr HORIZONS

By [illegible]

[illegible] [illegible]

[illegible]

Atlas. [illegible]

[illegible]

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[illegible] **[illegible]**. [illegible]

[illegible] **[illegible] single sheathed boxcars** [illegible] Central Railroad of New Jersey [illegible] Delaware & Hudson [illegible] Norfolk & Western [illegible] Reading [illegible] Western Maryland [illegible]

[illegible]

[illegible] [illegible] Union Pacific [illegible]

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[illegible]

Kato/USA. [illegible]

[illegible] Innovations. [illegible]

[illegible] [illegible]

[illegible] [illegible]

N Conventions. [illegible]

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Above: [illegible]

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Right: [illegible]

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